

ANARCHO-TRANSHUMAN IS A JOURNAL OF THE
UNCONTENT, OF THOSE WHO REFUSE TO EVER
SETTLE OR TEMPER THEIR DEMANDS.

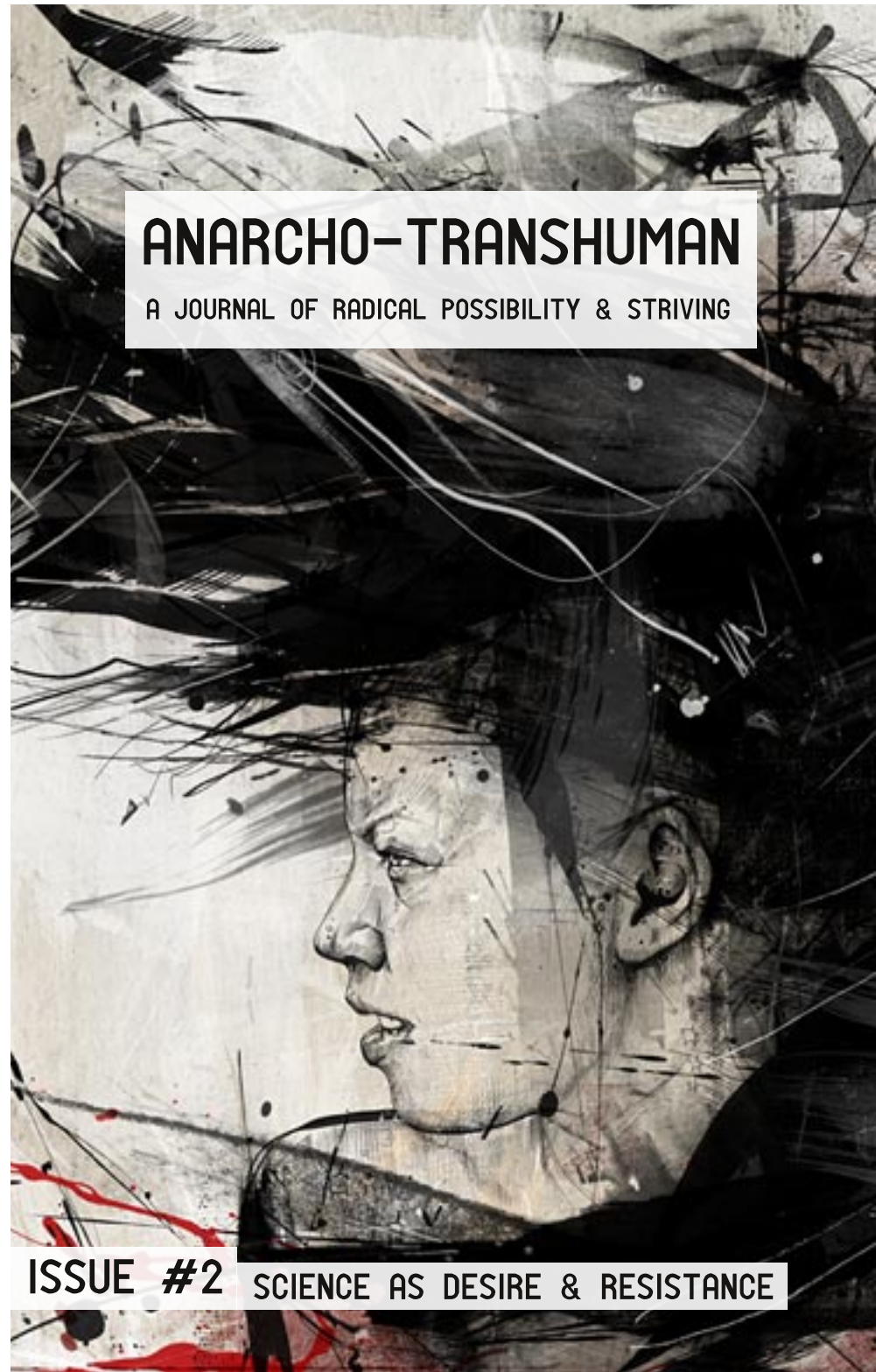
IN THE WORDS OF ANARCHISTS THROUGHOUT
THE AGES, WE DON'T WANT ANY ONE THING,
WE WANT EVERYTHING.



ANARCHO-TRANSHUMAN

A JOURNAL OF RADICAL POSSIBILITY & STRIVING

ISSUE #2 SCIENCE AS DESIRE & RESISTANCE



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ANARCHO-TRANSHUMAN

A JOURNAL OF RADICAL POSSIBILITY & STRIVING

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Points of Unity

Opposed to all power relations and social structures limiting or constricting agency; including but not limited to capitalism, the state, racism, sexism, heteronormativity, speciesism, and basically being a dick. Although technically if you want to become like a giant penis we suppose that's your own matter. For cognitive and morphological freedom.

Some works straight up borrowed when we could not contact original author.

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ISSUE 2

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innovation.

The state cannot be overcome by force, because another state would rise from the ashes of the human mind.

The scarcity and dependence on centralized expertise that appears to justify states can be abolished with the spread of disruptive technology.

biological organisms from a lab that was not allowed to sell to individuals.

In April 2008, a federal judge dismissed the mail and wire fraud charges against Kurtz, noting that there was insufficient proof to go forward. Ferrell was fined \$500 after pleading guilty to a count of mailing an injurious article, a misdemeanor.

Scientists had feared the case would be precedent-setting, but instead it has turned out to be a cautionary lesson about the dangers of under-educated law enforcement personnel who cannot tell the difference between a bioterrorist lab and an artist's studio using common bacteria.

The FBI says it has done much to make sure the Kurtz incident stays as the exception rather than the rule. Many safeguards and precautions have been put into place since the announcement, most important, the education of local law enforcement about DIY scientists and labs.

State enforcement will prove incapable of preventing anyone from, say, dumping noxious chemicals or developing the next superbug (indeed, states are already doing that — they just try to keep them in the lab) — but bio-hackerspace communities might. Everyone else's experiments tend to be known to others, and getting away with anything sinister is much harder.

The greatest risk in state control of scientific inquiry is this: the government is likely to suppress inventions that threaten profit and mass control. Energy and medicine (PDF) are particularly sensitive areas for the corporation-state. Scientists of the future must be skeptical of idea management by means of centralized systematic violence.

“It is the responsibility of scientists never to suppress knowledge, no matter how awkward that knowledge is, no matter how it may bother those in power. We are not smart enough to decide which pieces of knowledge are permissible and which are not.”- Carl Sagan, UCLA commencement speech on June 14, 1991

What they call the “social order,” we call predation.

What they call “unregulated” chaos, we recognize as a driver of

The pursuit of control rather than freedom is by definition rather shortsighted. One branch of the US government funds anarchist hackers to empower dissidents and destabilize enemy regimes, while the other, slightly more cogent branches of that same government desperately threaten and throw those same anarchist hackers in cages. Everywhere the capitalists are happily selling us the rope to hang them with.

Simply put the state invests so much in science because when riding a bucking tiger you progressively invest more and more of your energy into holding onto that tiger or you die. We forget that it is only quite recently in history that power structures have started investing in scientific research in hopes of monitoring, pacifying or redirecting the inventors and explorers. Those power structures that didn't take this approach have already been eaten by the tiger.

Our goal is to set it free.

Paternalism Comes Knocking

As is evident from several millennia of prudent governance by states, the right balance between free-form innovation and legal restriction will be struck. Statists are already calling for regulation, but restrictions are quite unenforceable (the tools and knowledge of garage science are becoming ever more accessible).

A number of regulatory approaches have been put forward: requiring biosafety training for all practitioners through programs designed by the Centers for Disease Control and Prevention, registering community labs with government agencies, requiring some type of personal liability insurance, excluding felons from DIY activities, and instituting screenings for loyalty and integrity. [2]

The feds have already goofed up an investigation, branding an artist as a bioterrorist.

Casting a long shadow over the DIY bio movement is the case of Steven J. Kurtz, an art professor at the State University of New York at Buffalo. The case has been held up as a warning about overly aggressive law enforcement in cases involving home laboratories. While not a scientist—professional or amateur—Kurtz uses DNA and other biological materials in his artwork.

In May 2004, Kurtz and his wife, Hope, had been preparing commissioned works when Hope Kurtz died at their home. Her husband called 911. Her death was later determined to be of natural causes. In attending to Hope Kurtz, emergency personnel observed Petri dishes containing bacteria cultures and food-testing equipment that was considered suspicious. They contacted the Federal Bureau of Investigation (FBI).

Authorities later told Kurtz he was being investigated for bioterrorism, and, eventually, Kurtz and Robert E. Ferrell, former chair of the University of Pittsburgh's Department of Human Genetics, were indicted on mail and wire fraud for their alleged efforts to obtain

“The press had a tendency to consistently overestimate [biohackers'] capabilities and underestimate our ethics.”

“DIY [biotech] people from all over the world ... got together last year, and we hammered out a common code of ethics. That's a lot more than conventional science has done.”

“[In a DIY bio lab,] you can work on a project and you don't have to justify to anyone that it's going to make a lot of money, that it's going to save mankind, or even that it's feasible.”

If you want to get involved, check out this listing of DIY wetlabs, or start your own.

If the success of young scientists like Jack Andraka (who surfed the internet and developed a promising and cheap pancreatic cancer screening test — with the help of professionals) are any indication, it's better to have a lot of moderately-trained people doing science than just a vanguard of highly trained experimenters.

Regarding experiments, something can be said for quantity over quality, perhaps for two reasons: First, experiments take time. The more the merrier. Second, accidental, wild, speculative results are born from intractable randomness — and positive Black Swans may be more likely to come out of science than, say, finance or statecraft.

In this era of big science, the most important lesson to be learned from [...] the achievements of countless amateurs is that scientific observations and discoveries don't necessarily require giant government grants and huge teams of researchers with specialized degrees. Small science still works, and it often works during off hours, weekends, and holidays when professionals are generally at home or on vacation.

—Forrest M. Mims III (1999), writing in *Science*.

Every Scientist Should Be An Anarchist

William Gillis

The first time I encountered the claim that an anarchistic society would impede scientific¹ progress I was too shocked — and later busy chortling — to sketch out a thorough response.

It's a surprising sentiment to me for a lot of reasons, not the least for the well known correspondence between scientific progress and social and material freedom in mass societies. I suppose liberals might be inclined to write this relation off as a low value-correspondence — like solely whether free speech is allowed or if folks even have time for anything besides the struggle to stay alive — but to me the connection seems quite obviously fundamental. Power relations of any kind are ultimately more constrictive of inquiry than they can ever be of benefit to it. The logic is simple: Control can only be achieved through disengagement and rigidity. And so any successful power structure must involve mechanisms to punish and suppress habits of inquiry.

Parents, teachers, bosses and cops... they all achieve control by mimicking the binary system of threats (absolute law and punishment) that the state uses. Rather than an organic system of constant, decentralized give and take that rewards wider attention, the anarchist approach seeks to ideally shrink the subject's attention down to a single, controllable input. This creates an artificial environment that rewards habits of rigidity and punishes persistent inquiry. And of course these

¹ I should note that I'm using the definition of science that involves seeking direct roots-up explanations (ie physics, mathematics, chemistry and a bit of biology) rather than merely anything that dabbles in empiricism.

habits are replicated in the communities and structures they create with their peers. Little has broken my heart more than going from teaching third graders who delightedly took to advanced algebra and calculus to jaded and broken middle schoolers whose priorities were social survival and escape from misery. Suffice to say, people would place far more value in science if they weren't constantly beaten down for having an open mind. Granted, it might end up taking a few generations for literally everyone to become a scientist, but even a moderate improvement would do wonders.

That's the reasoning for my general inclination that anarchistic societies would be far more facilitative of scientific inquiry. But the specifics paint exactly the same picture.

The centralized means of research and development characteristic of state involvement is hugely inefficient. (One can't help but suspect that might even be intentional.) Capital intensive undertakings like the LHC and NASA are widely known to be riddled with bureaucratic inefficiencies, in some cases raising costs by a full order of magnitude. The LHC would work better as a cooperative that elected its own, took donations and acted autonomously in its own interest rather than allowing every decision to be the result of totally unrelated diplomatic jockeying. NASA would work better broken up: some major projects acting like said cooperatives, others competing.

The corporate research model is one of incremental data collection bent severely by patent and military concerns. Aside from being hugely psychologically scarring to scientists and actively suppressing the sort of deep-thinking paradigmatic leaps that keep theoretical clutter from accumulating, the focus of investigation is largely determined from the top down in order to maximize short term benefits to those in power. Obviously this has led to all kinds of terrible consequences and has helped reinforce the notion of scientists as irresponsible lapdogs of authority, but more importantly it has had a retarding effect on scientific development as a whole. Logical follow-ups on discoveries or theoretical developments aren't just pursued unequally, whole trains of investigation are artificially accelerated or decelerated relative one another creating situations where realizations that speak to core issues with another train

Radical Biology

As a biologist, I can strongly affirm the accuracy of Taleb's notion of "accidental" discovery in this field. Biology is extremely complex and experimental outcomes are unpredictable.

Living organisms and cells require time to grow and change. There are too many moving parts and holding them constant is difficult because we don't even know how many parts there are and how they interact. Metabolic pathways are considered both discrete and continuous, but no one doubts that they are dynamically equilibrating systems that cannot be easily modeled, not as amenable to tinkering like mechanical or chemical engineering — even basic biology is expensive and has historically been the purview of big-budget institutions.

That is changing.

Theory, as usual, has a weak barrier to entry. Projects like TinkerCell allow cellular biologists to design their own metabolic pathways and share them open-source with a community, dramatically boosting stigmergic idea development and cross-pollination. What one wrote on a pad and paper and filed away in a dusty file cabinet for posterity will soon be indexed and searchable.

"Wetlabs," however, are the big story. These labs are now becoming available to those not associated with universities or corporations. Anyone in the community can pitch in and do biology. Science enthusiasts are organizing IRL to poke and prod at the mystery of life (Making the Modern Do-It-Yourself Biology Laboratory, Singularity Hub).

Molecular biologist Ellen Jorgensen established Genspace, a major DIY lab in Brooklyn. Some highlights from her TED talk:

"You might be asking yourself, 'What would I do in a biolab?' Well, it wasn't that long ago we were asking, 'What would anyone do with a personal computer?'"

medicine putting the impact of discoveries in a class of Mandelbrotian power-law style payoffs.

It is compounded by another effect: exposure to serendipity. People are starting to realize that a considerable component of the gravy in medical discoveries is coming from the “fringes”, people finding what they are not exactly looking for. It is not just that hypertension drugs lead to Viagra, angiogenesis drugs lead to the treatment of macular degeneration, tuberculosis drugs treat depression and Parkinson’s disease, etc., but that even discoveries that we claim to come from research are themselves highly accidental, the result of tinkering narrated *ex post* and dressed up as design. The high rate of failure should be sufficiently convincing of the lack of effectiveness of design. [...]

All the while institutional science is largely driven by causal certainties, or the illusion of the ability to grasp these certainties; stochastic tinkering does not have easy acceptance. Yet we are increasingly learning to practice it without knowing — thanks to overconfident entrepreneurs, naive investors, greedy investment bankers, and aggressive venture capitalists brought together by the free-market system [sic].

I am also optimistic that the academy is losing its power and ability to put knowledge in straightjackets and more out-of-the-box knowledge will be generated Wiki-style. But what I am saying is not totally new.

Accepting that technological improvement is an undirected (and unpredictable) stochastic process was the agenda of an almost unknown branch of Hellenic medicine in the second century Mediterranean Near East called the “*empirics*”. Its best known practitioners were Menodotus of Nicomedia and my hero of heroes Sextus Empiricus. They advocated theory-free opinion-free trial-and-error, literally stochastic medicine. Their voices were drowned by the theoretically driven Galenic, and later Arab-Aristotelian medicine that prevailed until recently.

aren’t discovered until well into its development.

Science works best in a state of informational anarchy. Paywall enclosed journals are now widely recognized as a stain on our field and a detriment to scientific progress. But so too does the severity of non-disclosure agreements (shaped both by market standards distorted towards capital and the availability of state coercion rather than polycentric arbitration systems predicated solely on reputation) not to mention the very enforceability of intellectual property openly suppress competition and innovation.

None of these issues of relative efficiency should be that surprising. Ultimately any collective pursuit is a processing problem and the more decentralized and richly connected a system is the better it’s capable of processing.

But what of funding itself?

On the one hand there’s a tendency to say well, so what if scientists end up pushing mops part-time? Plenty of scientists currently waste a lot of time on work irrelevant to their investigations (teaching, etc) and some of the best developments have come from people who preferred to earn their bread from less demanding side-jobs.

But the trick is that the efficiencies of anarchistic social arrangements extend to the social support infrastructure for science as well. A more efficient society provides greater background abundance, freeing inquiring minds that might otherwise be economically trapped and providing greater real wealth across the board. Even ignoring its ridiculous misallocation and inefficiency, government funding for research is both a fraction of that available through private grants and a ridiculously tiny percentage of the taxdollars currently collected even in a world leader like the US. It wouldn’t take much to expand the voluntary private/charitable sector (through investment groups or enthusiast donations as currently present in a lot of extremely expensive space exploration development) to at least cover existing costs. Further the interplay between researchers/designers, their supporters and the rest of the population would be more nuanced, transparent and accountable on all ends. And this is likely to stoke even more investment. Hierarchical,

centralized and edict-based power structures like the state and corporations act as information bottlenecks on every level and are prone to totalizing swings in policy with no capacity for graduated pressures.

Simply put, it seems obvious to me that there would be more scientists and a higher drive for science in an anarchistic society, plus a higher degree of efficiency that would benefit science directly as well as indirectly.

“If the State had been abolished a century ago, we’d all have robots and summer homes in the Asteroid belt.”

—Samuel Konkin

“Science is but a perversion of itself unless it has, as its ultimate goal, the betterment of humanity.”

—Nikola Tesla

Second, visible and legally liable institutions must abide the patent monopoly structure. They must pay for the use of ideas. Garage developers fly below the radar. Thus, R&D is cheaper, but patents make marketing a product prohibitively expensive and retard deliverability.

Finally, far-out ideas make established scientists uncomfortable. If your entire career was built around the fax machine, phrenology, the geocentric model or the beeper, you’re not too excited about these crazy kids and their ideas. There is a lot of untapped brainpower out there. The state education mill is a barrier to entry, a great divider — a credential firewall. MOOCs and badges may displace the academic cartel, but not without vested interests fighting to halt creative destruction along the way.

Aided by Randomness

“Academic Libertarian,” statistician and philosopher Nassim Nicholas Taleb recognizes that “stochastic tinkering” rather than systematic, institutional agendas yield the greatest discoveries. Taleb is best known for coining the term “Black Swan,” to describe hard-to-predict and disproportionately momentous events.

Stochastic tinkering is a process of trial and error, present in all creative endeavors, where randomness plays a great role. Taleb writes, in his essay *The Birth of Stochastic Science* (PDF):

The world is giving us more “cheap options”, and options benefit principally from uncertainty. So I am particularly optimistic about medical cures. To the dismay of many planners, there is an acceleration of the random element in

The individual is the basic functional unit of innovation. Institutions provide resources — capital, human and fixed. But free people can achieve a lot with very little.

Steve Wozniak built Apple from a garage (with the help of frontman Jobs), and now it reigns among the largest companies in the world (not to glorify the crooks at Apple — they are patent trolls and sweatshop labor exploiters).

Do-It-Yourself scientists working in hackerspaces are positioned to make significant contributions with low overhead and little formal training (becoming necessary and valuable apprenticeship sites as the current higher education system deteriorates). The state has yet to heavily clamp down, but, because such freedom threatens the status quo, we can expect intervention to intensify.

Stigmergic Science

The magnitude of creative productivity is most strongly correlated with the number of researchers, and less with the talent of the individuals involved, and fortunately the positive feedback loop (or virtuous cycle) of technology continues to lower the cost of instrumentation. That is, happy accident probability is proportional to time invested rather than just skill.

Establishment science institutions are somewhat impeded from developing groundbreaking, disruptive or revolutionary technologies, for three reasons:

First, they need to be able to monopolize them. Anything that lends itself to decentralization (solar power, self-replicating 3D printers) threatens the established order and will be resisted to the end. If a modern-day Nikola Tesla were to invent a disruptive energy technology, s/he would likely be suppressed, just as J.P. Morgan and Edison suppressed [1] Tesla.

Every Anarchist Should Be A Scientist

Isis Lovecruft

All anarchists should be scientists, at least to some extent. We should never allow ourselves to become so rigid as to forget what makes us anarchists in the first place: childlike curiosity, incessant inquiry, and a radical love for taking things to their roots to further our understanding. We seek to dismantle the world around us, knowing that it does not function as well as it could. We want to understand ourselves, our environment, and each other. We want the blueprints for the social machine, so we can sledgehammer the fuck out of it, and build it back up from scratch.

You know what that sounds like? That sounds like science. And that sounds like hacking.

Anarchists are radicals, and I shouldn't need to point out for the zillionth time that radicalism means taking things down to the roots.

So, anarchists are scientists, even if some resign to mere social science. Anarchists are hackers, even if in some cases that only goes as far as hacking up an herbal tincture for a sick friend. Their walls cannot stop us; there are infinite possible paths around and under and even through.

This is our world now... the world of the electron and the switch, the beauty of the baud. We make use of a service already existing without paying for what could be dirt-cheap if it wasn't run by profiteering gluttons, and you call us criminals. We explore... and you call us criminals. We seek after knowledge... and you call us criminals. We exist without skin color, without nationality, without religious bias... and you

call us criminals. You build atomic bombs, you wage wars, you murder, cheat, and lie to us and try to make us believe it's for our own good, yet we're the criminals.

Yes, I am a criminal. My crime is that of curiosity. My crime is that of judging people by what they say and think, not what they look like. My crime is that of outsmarting you, something that you will never forgive me for.

I am a hacker, and this is my manifesto. You may stop this individual, but you can't stop us all.

Decentralizing Science: Local Biohacking

Sebastian A.B.

Do-It-Yourself scientists working in hackerspaces are positioned to make significant contributions with low overhead and little formal training (becoming necessary and valuable apprenticeship sites as the current higher education system deteriorates). The state has yet to heavily clamp down, but, because such freedom threatens the status quo, we can expect intervention to intensify.

A hacker is someone who enjoys playful cleverness—not necessarily with computers. The programmers in the old MIT free software community of the 60s and 70s referred to themselves as hackers. Around 1980, journalists who discovered the hacker community mistakenly took the term to mean “security breaker.”

—Richard Stallman

Science and innovation are chaotic, stochastic processes that cannot be governed and controlled by desk-bound planners and politicians, whatever their intentions. Good scientists are by definition anarchists.

—Theo Wallimann, biologist at ETH Zurich

Science as Anarchy: Fragments of a Manifesto

Matilde Marcolli

"Science is an essentially anarchic enterprise: theoretical anarchism is more humanitarian and more likely to encourage progress than its law-and-order alternatives"

—Paul Feyerabend, "Against Method"

People who swear by quantum physics and pursue its consequences in all domains are no less bound politically than comrades fighting against a multinational agribusiness. They will all be led, sooner or later, to defection and combat.

—The invisible committee, "The coming insurrection"

Destroy All Figures of Authority

Authority suffocates the creative drive of science. Trust no one, destroy personality cults, dismember individual mythologies! The bureaucrats are the scientist's worst enemy. They poison the ground where science takes roots. Where bureaucracy is allowed to exist science will die. Bureaucracy cannot be argued with, only destroyed. A more subtle and much more difficult form of authority to confront is that which emerges internally to science: the cults of personality that grow

like weed around the nicer achievements of research have the sole effect of suffocating their creative momentum, transforming a fluid and genuinely innovative impetus of ideas into a rigid and oppressive force that prevents new ideas from developing away from an accepted orthodoxy of establishment. There is no room in science for personality cults. Boycott conferences: they are but thinly disguised temples consecrated to the cult of this or that fetish, aimed at reinforcing mob thinking, pledging alliance to one or another master. No gods no masters! Do not allow anybody, on the basis of "reputation" alone to confidently preach others about things they in truth know nothing about: having a valuable specific expertise does not confer to anyone universal authority. Always question anyone's assertions, no matter how loudly and emphatically pronounced. Everybody has equal right to existence and should be guaranteed equal room for expression. The validity of results is decided by careful scrutiny not by appeal to authority principles.

Such are the slogans of our imaginary manifesto of the anarchical scientist, or of the scientific anarchist, you choose. However, having said this, one needs a more careful reflection on why hierarchical structures still survive and thrive within the scientific community. Why do so many scientists fall so easily prey to the temptation of personality cults? Why do they welcome the imposition of authority which is so seemingly extraneous to the functioning of scientific thought? Why do they form gangs that marginalize and attack those members of the community who refuse to accept the proclaimed sainthood of this or that famous name?

Perhaps a good place where to start such a reflection is a little known booklet called "The tacit dimension", which contains the text of the Terry Lectures delivered at Yale in 1966 by physical chemist turned philosopher Michael Polanyi. The booklet has been recently republished by the University of Chicago Press. While I certainly disagree with many of the conclusions of the book and with the overall tone of Polanyi's reflections, it still does contain some very important insights precisely on the problem of structures of authority within the scientific community. The point that Polanyi stresses in his public address is the background of hidden, implicit knowledge, difficult to pin down and describe precisely,

and as long as the information of others is contained, then it lives on in other individuals. I call this passive specialization, that is, it doesn't exist at any one point in time, nor does it have any capacity for coercion or manipulation. If someone writes about some observation or something that they've made, and you read about it months later and make it, there's no issue. However, if someone is making something, and they require you to contribute back, then you're stuck on a factory line somewhere. The technology I am discussing here does not require anyone on any part of the chain of production.

I had a thought experiment on the Infoshop.org forums before I stopped posting there again. Basically, I believed I could make a steam engine simply by being dropped in the middle of a forest somewhere. And I still believe that to this day. I have made a Gingergy Machine (which I should note is the prime example of passive specialization; someone wrote a book designing how to make steam engines and other machines, and, well, I made it 20-30 years later). It's a simple smelting process, and a smelt can be made of rudimentary materials. Quite literally the difference between industrial age, and primitivism is several thousand years of knowledge, nothing more. You could put me in the middle of a forest by a river, and I could come out of that forest with a steam powered boat in a few years at most. This idea of the self-contained technology, the self-describing, self-iterating technology is far better than that of the technologies which capitalists own and produce. Their technologies are based on the impossible levels of academia required to understand it, and they make no efforts to make that technology known to anyone, because it would be disastrous to their profitability. If anyone could make anything, then, well, there'd be no need for insane production lines where people slave away making worthless bits of plastic.

Proprietarianism is the bane to curiosity.

capitalist technology is rooted on this higher educational learning system, which is why the entry requirements are so impossibly high for most people. It isn't that technology cannot be simplified and understood by anyone, it's that capitalists have insured that those who use technology cannot understand it without it being difficult to understand. It is the status quo, inherently. Academic language, proprietary information. If information were free there would be no way to profit from it.

I envision a world where ALLogy (and information in general) is freely accessible in this way. No barriers to understanding, you could sit down, and even if it took you a few days, you could go over the design documents of a given technology and learn how it worked to the very minute details of electronic circuitry. Self-describing technologies, that require little more than a simple manual that can be played with, just like those children in New Delhi played with their GUI system, to the point of teaching themselves a foreign language. Instead of an LCD being described as lots of chemical reactions and lots of convoluted mathematical constructs to get there using arbitrary element tables, it could be described in concise glyphs for each level you operate. The first glyph being representative of "LCD." Click on this, and then expand, and then you get the constituent parts of that LCD. Each part being composed of even still a more simple component. If you want to make an LCD, you just go to some place where they are made, and press a few buttons, and volia, you have one. If you want to understand how that LCD operates, you play with that simple GUI until you have determined how it works and how it is manufactured. Then you can go to that place where LCDs are made and have a bit of common understanding with those there who have simplified the manufacturing process to the point of pressing that button.

People act as if technology is beyond the grasp of a given human being, that without this large swarm of specialized individuals working together for a common goal, it couldn't exist. I don't believe that this is the case, at least, with regards to the "working together" part. Of course I must admit that specialization is necessary for a given bit of information to come into existence, but I believe that this can be a gradual process,

which plays a crucial role in the advancement of science. He starts by recalling Plato's Meno paradox, by which it is seemingly impossible to identify precisely the question one wishes to investigate if one does not already know what one is looking for. Formulated in more modern terms than in Plato's original dialog, this refers to that very important component of scientific progress which is not solving a well known problem, but finding the problem one wishes to solve, in such a way that it is interesting, doable, and likely to have a significant impact on science. We all know from the very start of our careers how difficult it is to resolve the tension between finding a problem that is doable *and* interesting *and* that has not yet been solved by someone else. In Polanyi's words, the modern version of Plato's paradox is the following:

It is commonplace that all research must start from a problem. Research can be successful only if the problem is good; it can be original only if the problem is original. But how can one see a problem, any problem, let alone a good problem? For to see a problem is to see something that is hidden. It is to have an intimation of the coherence of hitherto not comprehended particulars. The problem is good if this intimation is true; it is original if no one else can see the possibilities of the comprehension that we are anticipating. To see a problem that will lead to a great discovery is not just to see something hidden, but to see something of which the rest of humanity cannot have even an inkling. All of this is commonplace; we take it for granted without noticing the clash of self-contradiction entailed in it.

—Michael Polanyi, "The tacit dimension"

I have quoted this text extensively since here I do agree with Polanyi's conclusion that the Meno paradox is the origin and justification for the survival of hierarchical structures of authority within the scientific community. However, while the author welcomes the

permanence of such structures I personally, as anarchical scientist and scientific anarchist, call for their prompt and irreversible dismissal. To understand why the problem so clearly outlined in the text above can be seen as the justification for the persistence of power structures, one can again recall the experience that all of us scientists have faced, of how difficult it is to navigate precisely that part of the scientific enterprise: finding one's way through Baudelaire's "forest of symbols" and perceiving hidden structures before they can be organized into precise statements and rigorous arguments. This process is uncertain and frightening: one can easily end up investing an enormous amount of time and energy developing an idea that turns out to be a red herring. One can easily corner oneself into a blind alley by chasing some fleeting ghosts that appear to promise rewarding results only to vanish into one's own scientific twilight. It is no wonder that most people are, more or less openly, scared of this perspective. That is what creates the wish for the savior, the hero that will come to the rescue of the lost voyager, pointing to the right path across the wilderness. It is fear that instills in humans the worship of authority: it was the lurking shadows in our ancestral darkness that generated religions, and it is the uncertainty and dangers of the road that make courageous explorers turn into sheepish followers. Some scientists appear to be especially good at spotting patterns, at sniffing out where the interesting stuff lies buried. They see the hidden connection that escaped detection even though it was under everybody's eyes. Naturally, due to the fears just described, others prefer to group together in the crowded space surrounding the people who appear to know where they are going, so as not to risk losing one's way in the forest. By doing so they sanction and contribute to create a hierarchy structure, a cluster of power and authority bestowed upon a person who is invested with the task of deciding for others. This is extremely dangerous, in my opinion (not in Polanyi's one and that's where we profoundly disagree) because people voluntarily relinquish their own authority over themselves, and in order to justify their own weakness they readily impose their chosen god on all those others who would have happily continued to wander around their own voyage of exploration without delegating it onto anybody else to set the course for everyone.

Instead of blindly delegating to others to make decisions as to what

you'd lose yourself in the jumble of specialized technologies that exist within one. The cost of entry dissuades you from actually taking one apart, and once you do so the complexity related to the technology is essentially beyond you, with the information related to that technology bound up in patents, and electronics documentation that only higher education could give you, which is in itself a costly process. It's not like some evil thing, it's just how things are. Capitalism perpetuates these systems, to its own benefit. This is why I envision a world where you could tear apart a TV, without worrying about the entry fee, and having access to the design documents that make up the whole of that TV. I was a kid and I took apart several TVs. Naturally I never figured out how they worked, though I understood the basic watered down principles that are explained to you to suppress your desire to actually, truly, understand. I remember getting cut very badly on one tube I'd taken apart, and freaking out because I thought that it had "radioactive particles" inside. The bits in the tube are poisonous, but I don't think they're radioactive (actually I'm pretty sure they're not to any significantly measurable extent). I just gleaned that from the typical "warning! X-ray radiation risk" sticker that is pasted to every CRT tube that's out there.

If it is hard for me to figure something out, then I probably won't even attempt to try. I think this goes for many people. If I'm dissuaded from understanding how one simple thing works, if not by the complicated specialized technologies in it, but by the lack of information related to it, it becomes a task in futility. Why waste my time learning something that capitalism has locked up in boxes, keeping me from ever understanding it? And I'm not talking about academic manuals that "show you" in highly convoluted language requiring years of education to understand, I'm talking about those kids in New Delhi. They learned how to operate a computer because computer GUI systems are learnable through observation, trial and error, curiosity. Thus I would want my documentation to make that TV in such a simple to understand form that all technology related to TVs could be self-described and understood. I don't need to know how that IC component works to understand that it goes in a certain place, but I'd want the ability to see how that IC works in any case. Capitalism, capitalist science, and

Church has become increasingly weak. If you read the link I provided, we can see children walking up to this completely foreign object, moving a mouse around, and determining how things "work" within the confines of that system. There needn't be someone there telling them to click this or that, or to open this or that or how to do this or that. They simply *learn*. The human mind is inherently a pattern recognition engine, this is pretty much the consensus within neural research. It soaks them up, patterns, that is. So once you understand this, it isn't so remarkable that some street children in New Delhi could walk up to a computer and figure out how it works.

But I believe the state wants to suppress our curiosity, and indeed, our expression of that curiosity. It wants to keep us simplistic beings incapable of understanding anything more than being drones doing whatever specialized job it has shoved down our throats. Not in any sort of nefarious, covert, evil way, just part of a self-perpetuating system of, well, irrationality. It feeds us irrational religion, irrational mysticism, irrational consumerism, to the point that we are incapable of actually understanding our world, and indeed, not desiring to understand our world because that innate curiosity is fulfilled. I've made mention before, of the whole "restless legs syndrom" pill that they have out now. It came to my attention because I actually do get fidgety at night and kick my legs around a bit, but it subsides after awhile and I have control over it. I don't really need a fucking pill. But the commercials that one who is afflicted by this habitual practice are happy to explain that they affect the motorcortex neurons so that you can sleep at night. But that's utter fucking gobbledy gook. It makes no sense. I no more understand what those commercials are talking about than I understand how rockets work. Actually, I know more about rockets than the crap such commercials attempt to explain away in the 30 second spot it has to do so. What we're faced with in everyday life is the suppression, and indeed, theft of our curiosity. A world inundated with work, with hierarchical structures, and property make this the case. Though I'm struggling here to explain exactly why this is the case.

One example might be the TV. A TV costs a bit of money and taking one apart and trying to figure out how it works is a task in futility,

is interesting, new, and relevant, it would be much more useful to try to better understand what it is that gives to certain people a better feeling for the hidden dimension, a better compass to navigate uncharted waters. I come back to precisely this point in the next chapter of my imaginary manifesto.

Before getting to that, I still want to make some remarks on why I consider that figures of authority should have no place in the scientific enterprise and why I think that the latter is in essence a perfect model of a society organized on the basis of anarchist principles. I would like to quote again an interesting passage from the same source:

I would call it the "principle of mutual control"... each scientist is both subject to criticism by all others and encouraged by their appreciation ... This is how "scientific opinion" is formed, which enforces scientific standards and regulates the distribution of professional opportunities. It is clear that only fellow scientists working in closely related fields are competent to exercise direct authority over each other, but their personal fields will form "chains of overlapping neighborhoods" extending over the entire range of science.

—Michael Polanyi, "The tacit dimension"

It is hard not to see in this structure of diffuse and self organizing power, this decentralized form of authority by consent and mutual collaborative criticism

an echo of the anarchist vision of the communes as basic diffuse organizational principle of the society, with the "chains of overlapping neighborhoods" of competence connecting them into a larger organizational form, built from the ground up, from collectives, communes, loose associations, coordinated into an emergent large scale correlational principle which is self regulating and does not need the imposition of nation states, gods or masters. The natural functioning of

the scientific community is based on the principle of peer reviewing as the basis for establishing the validity of scientific results, on the anonymous unpaid voluntary work of the large number of referees who donate their time to the purpose of contributing to the collective functioning of the community, to the advancement of what we call science. This is the best historical realization of the self-structuring principle of society that the anarchist movement predicted. It is strictly incompatible with the idea of a proclaimed figure of authority who dictates the canons of truth.

The Written Word As Sanctuary

The only genuinely democratic venue for scientific communication is the written word. Unlike the spoken interactions, which are entirely dominated by relations of dominance and subservience, by prejudices and prevarications, the written communication is non-aggressive, open to everybody equally, and not colored by personal bias. The internet archives are open to anyone to post results and read other people's results: no written paper screams louder than others, none prevents others from speaking, none is allowed a greater room for expression at the expense of all others. Within the context of written communication, nobody can disrupt another person's presentation with continuous interruptions, nobody can use their position of authority to suppress others. Beware of critics of the written word, because they are usually motivated by the fear of losing a dominance position gained through the continuous practice of verbal aggression. The collectivity of books is the best antidote against the cults of personality and the worship of authority figures. The scientific mind thrives in the plurality of opinions, in multitude. Books are our best weapon in the fight for self expression and freedom from the oppression of authority. The broad landscape of human knowledge is humbling, and precisely this humbling effect is what protects us from the monsters of the ego, what makes us free to think and enjoy being part of that multitude of thoughts, each of us a dwarf, collectively a giant. The humbling vision of our own individual place in the vast aggregate that constitutes human knowledge is what sets

Curiosity is the Harbinger of Revolution

Why

In a discussion on Infoshop.org recently I was reminded of an experiment an Indian physicist did. What he did was put a PC in a wall in the slums of New Delhi, and watched what happened. What happened, perhaps unintuitively, was one of the most remarkable insights into the human psyche. As the experiment played out the physicist noticed who made the most use out of the computer, and then noted the behavior of the people who used it.

The results, were amazing. Ghetto children, aged 6-12, would make most use of the PC, to the point of being able to browse the internet, download music, draw, and teach themselves English. No outside assistance. No outside guidance. They just did it.

Human beings are curious creatures. There are few things one could say are "natural" tendencies. After all, our societies have existed in a similar state for as long as historical record goes back, and we can see that while many of them are similar, there's nothing innate to all human societies as a whole. You look at the feral children which we have discovered, and it becomes obvious that the "natural" tendencies of the human are quite small. But I posit that curiosity is one of them.

There are certain ideologies within the movement which are anti-curiosity. They beg to create a form of mysticism to declare away the universe and how it operates, in order to "fullfill" that innate desire to understand how things work. The Church kept people from reading for hundreds of years, if not thousands (too lazy to check). And rightly so, as we have seen that with the dessimination of knowledge the power of the

us free to be truly creative and not driven by narcissism and self indulgence. Truly creative and original thought is such precisely because it feeds on knowledge, on the common heritage of mankind, on the experience of our shared collective mind.

This second installment of my imaginary anarchical scientist's manifesto brings me back to the question of the "tacit dimension" and an attempt to understand that special quality some people seem to have that makes them able to see structure where none is apparent, to have a more developed intuition for where things seem to go, where the hidden spring of water lies in the apparent desert. Instead of leaving this mysterious quality lingering unexplained on the verge of a semi-mystical interpretation, as Michael Polanyi does in his lectures, I would like to put forward a simple explanation and refreshing explanation: this special talent, so envied that people are ready to invest it of an aura of embodiment of divine (and therefore unquestioned) authority, has mostly to do with the degree of connectedness. Once again, those who are able to see farther are those who are able to climb upon the shoulder of giants, which is to say, have the broadest and more diversified knowledge. In other words, instead of worshipping a naive cult of personality of people with an undeniable strong sense of intuition, cultivate within yourself that same capacity by broadening your horizons: reading books, not necessarily immediately relevant to one's own current research topics but bordering on other "overlapping neighborhoods" of the map of scientific knowledge, is the most important activity for a scientist!

Those famous scientists who, like Feynman, scorn the reading of books have evidently suspicious motives: at the personal level they enjoy having created a niche for a cult of personality, with a court of followers constantly engaged in the pleasing of their personal ego, thus betraying the fundamental spirit of science as a collective. Naturally they fear the one thing that has the power to dethrone them. They fear books and encourage others not to read them simply because books provide a liberating vision of the broad landscape, they restore proportion, they deflate egos. Books provide all people, equally and democratically, with the same opportunity to acquire a broad landscape of knowledge,

sufficient to guide their own path, with no further need to hide behind the worshipping of figures of authority to whom decisions of intellectual worthiness are constantly delegated. People who have been cast into this role rarely reject it. More often than not, they adapt to it with complacency because it flatters the ego. Naturally, they begin to fear the loss of this supremacy role. So beware of the motives behind the behavior of people who enjoy a position of authority and have started to fear the true democratic, collective, and anonymous life of the scientific commune.

The true nature of the "hidden dimension" is the dimension of reading, the broadest form of interconnectedness of the human race as a whole and the only real sustaining structure for an ideal society based on a loosely connected network of anarchist communes. The written word is the only form of communication that crosses barriers of time and space, cultural divides, conflicting sociological structures. An enterprise like science, which is by its very nature transcending all divisive aspects and which constitutes the true unifying force of the human race, can only benefit from a form of communication that is also by its very nature inclusive and decentralized, democratic and anti-authoritarian, and which provides us with a diffuse network of knowledge, a safety net which is the only guiding light to find the path of progress hidden within the forest of symbols.

Of Science as War

"As a humanist, I love science. I hate superstition, which could never have given us A-bombs."

—Kurt Vonnegut, "Armageddon in Retrospect"

"The catastrophe is not coming, it is here. We are already situated within the collapse of civilization. It is within this reality that we must choose sides."

—The invisible committee, "The coming insurrection"

and control. The system has its own logic. If you are a player in it, you have to follow that logic. You have to take what you can grab – for most people it's their own lives – and turn it into money. If you're excluded from the system, you're excluded from the very means of survival. If you're excluded and you try to get the means of survival for yourself or your loved ones outside the system, you will be met with violence. Profit, accumulation, and economic growth are more than dominant ideas: they define capitalism as a system of relations.

Thus, for a stabilized atmosphere, we are going to have to defeat some very powerful people and institutions in the process of liberating ourselves – and science – from the dictates of profit. Success in this struggle will require all the tools of social change: organization, communication, demonstration, and experimentation with different actions.

The intelligence that drives scientific inquiry is a profound human capacity, but science alone can never tell us how to act. It cannot provide principles, even though it can help us to act within them once we have them. For this reason, science will never be enough to do political battle with conservative movements or powerful corporations. For that, people have to find moral guidance from other human capacities and other cultural resources: art, literature, philosophy, relationships, and even, in its proper place, religion. In the fight for a just and sustainable world, there can be no substitute for organized political struggle – a fact scientists themselves increasingly recognize.

In fact, in the book *Descartes' Error*, the neurologist António Damásio calls on studies that show rational decision-making is impossible without emotions.

In the case of climate change, we have an overwhelming and nearly unprecedented scientific consensus, with all the authority Science A can bring combined with all of the knowledge that Science C has been able to generate. But without major political change, elites are able to continue on a path of greater fossil fuel use and escalating climatic rupture. As with other issues, vested interests direct policy by proactively controlling the direction of science (Science B), using media and government agencies to attack the credibility of scientists, their reputation, and their morale, and hiding or confusing the information available to the public. Facing this kind of resolute political opposition, an approach, a strategy, and a set of political principles must be chosen. Science itself cannot provide these things.

This becomes clear when we consider two different approaches to combatting catastrophic climate change. For many mainstream environmentalists, the path has always seemed clear. We live in a democracy, after all. So, first, we convince enough people that the climate problem is serious. We demonstrate that the technology is available to solve it without sacrificing most comforts and conveniences. Then we convince our leaders to make the necessary technological and policy changes, and if they don't, then we elect leaders who do. Many of those who make economic decisions aren't elected, it's true. But they, too, can be convinced by rational arguments. Business leaders meet with environmentalists regularly. If parts of the planet become uninhabitable and there are a series of climate-related catastrophes, that would be bad for business, the argument goes. So even captains of industry will come along with the right arguments and proposals.

In 2014, as oil and gas production continues at a breakneck pace in Canada and the U.S., we have more than enough evidence to know that such an apolitical approach of lobbying and persuasion has failed disastrously. The basic nature of the system we live in isn't democratic. It's a system that takes the elements of life – nature, land, water, energy, cultures, and peoples – and converts them into commodities for profit

Since so much of the interpersonal relations within the scientific community are based on aggression, let us stop pretending that we are a peaceful lot. One may begin to wonder, if the whole point becomes that of perfecting the art of war and confrontation, why not to just go over openly to those who do that for a living. Perhaps, instead of agitating our pacifist banners on the front, while continuing to think in terms of tactics and battles in our daily practice of human interactions within the community (competition, priority claims, verbal aggression) we should just sell off completely to the military and to the financial sharks of capitalism and start acting out openly the true nature of a scientific community we idealize in words and revile in acts. It is too easy to start feeling that all feelings of love, passion, affection, dedication only weaken our stance, because they only make us more easily vulnerable to attacks, and that rage remains the only successful motivation for the pursuit of scientific discoveries, an all encompassing, all consuming rage. Perhaps what we see happening within the scientific community is just an enactment of a deep truth about the human nature that brings people to choose aggression over cooperation, the same justification that is used over and over to justify the existence of capitalism as an economic system. If this were truly the case, then perhaps the making of the atomic bomb should be regarded as the greatest scientific achievement of mankind, precisely because it gave mankind the means for total self-annihilation. However, there is an alternative to being forever locked in the grip of this war/aggression mentality. There is the possibility of cooperation, of a shared common good, one that transcends the individual egos and their primal needs for recognition.

The Monsters of the Ego

The early days of psychoanalysis tended to depict the ego as the healthy rational mind and the unconscious as the realm of the "monsters of the id". Far from being the case, the ego is the tyrannical monster that enslaves our creativity, our potentials for invention, and

hijacks it at the service of its own infinite narcissism. The unconscious is the realm of the mind that supplies us with dreams, with ideas, with beauty. Narcissism is the worse enemy that stands in the way of the development of durable interpersonal relations based on true mutual understanding, on the capacity for listening and appreciating another person's mind, of sharing knowledge, thoughts, ideas, in other words, of what we usually call progress. The narcissistic needs of the ego are infinitely regressive and they stand in the way of all forms of creativity, but most of all of science, which is by its very nature a very humbling form of self awareness, which confronts us with the magnitude of reality and the insignificance of the personal ego.

The fact that the science functions primarily as a collective enterprise and as a self-correcting process which is de-localized and largely anonymous is important in preventing the monsters of the ego to undermine its achievements. As a simple and concrete example, although I myself blog about my life as a scientist, I am profoundly skeptical of the growing tendency to hijack the nature of scientific discourse away from its natural venue, which is that of peer reviewed professional publishing and divert scientific discussions into the public blog arena. The danger is to create an atmosphere of ideological pressure, where the validity of scientific theories is no longer established by the careful work of that delicate structure of voluntary refereeing process that self-regulates the functioning of science as a collective. Exposing science to blog discussions means to leave it open to statements of authority and personality cults, to the violent impositions of those who are the loudest, the most outrageous, the most vitriolic acrobats of the blogosphere, with no respect for that careful, silent and invisible, but very crucial self-regulatory mechanism which is the essence of the scientific commune.

Blogs play a very important role as grass-root journalism, as a place for the type of political discourse that is otherwise excluded from the business controlled media. I think they contribute essentially to healthy forms of debate within the society, but they may not constitute the best place for scientific debate itself. The difficult self-correcting process by which science improves itself is too delicate a dynamical equilibrium to

correlating a wide range of social problems with economic inequality suggest that people are highly sensitive to status and that social policy should be designed to minimize inequality with this in mind. Philosophers have long debated whether human nature has an instinct for freedom, and while scientific knowledge about human nature remains extremely limited, what little science has revealed suggests that humans do have instincts both for freedom and for equality.

Another set of studies, about moral licensing, suggests that voluntarist appeals have severe limitations. In one study, subjects who had made a green or eco-friendly consumer choice were afterwards less likely to donate to a good cause or help an individual in need. Here, too, we find social science research that suggests that relying on solidarity works better than relying on charity, as charity can be brittle.

A third area of research shows that political ideology affects consumer choices. An American study published in the Proceedings of the National Academy of Sciences found that "conservative individuals were less likely to purchase a more expensive energy-efficient light bulb when it was labelled with an environmental message than when it was unlabelled." Today's capitalist society means that many of these insights are coming from business-oriented research on marketing and organizational behaviour. Leftists shouldn't shy from studying these insights, discarding the useless ones, and adapting the helpful ones.

No Substitute for the Left

The scientifically minded do not automatically gravitate toward the political left. Partly because of the influence of Science A (authority) and Science B (business), many scientifically minded people assume that to be scientific means to be neutral, to reserve judgment, to refuse a stance even on the most critical issues of the day. In fact, science says no such thing. Scientific objectivity means being conscious of biases within a given framework and acting to minimize them while testing claims against evidence. It does not mean having no opinion and no point of view (or, for that matter, accepting a given framework without question).

bureaucracies are designed to do, in terms of fostering original research, the results have been catastrophic.

“Common sense suggests that if you want to maximize scientific creativity, you find some bright people, give them the resources they need to pursue whatever idea comes into their heads, and then leave them alone ... if you want to minimize the possibility of unexpected breakthroughs, tell those same people they will receive no resources at all unless they spend the bulk of their time competing against each other to convince you they know in advance what they are going to discover.”

Graeber gives us an important insight into how Science B has come to trump Science C. Leftists, meanwhile, are natural supporters of Science C, and left-wing scientists like the evolutionary biologist Richard C. Lewontin and the mathematical ecologist Richard Levins use the term “people’s science” to describe how science could be done in a better society. While most of us have a healthy anti-authority streak that can bring us into conflict with scientific authority (Science A), the best challenges to that authority, indeed any authority, are themselves made on the basis of logic, evidence, and inquiry. One of the tasks of the political left, then, is to liberate and encourage the rigorous curiosity of Science C.

Science and Social Movements

Marx and the early socialists viewed their work as scientific in nature, and even their errors can be understood as failures to act according to their own scientific principles. Generations later, socialists like Trotsky, Luxemburg, and others tried to popularize scientific discoveries and intellectual culture for the people. Today, even though leftists are few in number and not especially influential, the natural and social sciences are good places to look for them.

Leftists try to make change by convincing large numbers of people to take action in social movements. Insights from the social sciences could inform leftists in these efforts. For example, recent studies

be given in the hands of those people whose main intent is to show off the size to which their egos (and occasionally other equally irrelevant parts of their anatomy) can be inflated. It may be a good idea to reserve the blogging skills of scientists to create a venue for a healthy, if animated, discussion the sociological, philosophical, and political aspects of the scientific community and keep the discussion of science itself where it belongs, in the natural environment in which it flourishes, the scientific commune and its diffuse, invisible, collective, anti-authoritarian power organization.

I remain reasonably optimistic though about the basic and deeper functioning of the scientific community and its self-correcting mechanisms, and I believe that probably over time those blogs whose sole purpose is to promote one's ego will die out and the ones that have a honest focus on a more balanced discussion of actual scientific information will survive and possibly become integrated into the accepted modes of scientific debate.

“We are not depressed; we're on strike. [...] From then on medication and the police are the only possible forms of conciliation.”

—The invisible committee, "The coming insurrection"

Science and Business

This is what I call Science B, the business of science. The sad truth is that most of what scientists do is not Science C, exploring the world through systematic investigation. Most of what scientists do is try to raise funds, generate publications in prestigious journals, find students to work on their projects, and keep up with other scientists according to these metrics. Science B operates like other sectors of capitalist society. It is competitive, comparative, and divided by status into superstars, has-beens, and also-rans.

The Canadian Association of University Teachers (CAUT) launched a campaign last summer called Get Science Right. Aiming to overhaul the federal science policy that oversees Science B, CAUT argued for more money for basic science, since funding in the natural sciences has fallen by 6.4 per cent since 2007. Meanwhile, the federal government has increased funding for research partnerships – partnerships between science and business – by 23 per cent since 2011.

The business of science makes science vulnerable to attack by authoritarian governments and conservative movements, streamlining opportunities for the wealthy and powerful to steer science to their own benefit. As a result, we can create tens of thousands of chemicals but haven't thought much about what to do with them after we've used them. Half a dozen countries have nuclear weapons that can destroy whole cities, but no country has a functioning renewable energy system. Human curiosity (Science C) could have solved our environmental problems long ago, but it cannot take flight because it is trapped within Science B.

Writing for the Baffler magazine, the well-known cultural anthropologist David Graeber assessed the problem. "The increasing interpenetration of government, university, and private firms has led everyone to adopt the language, sensibilities, and organizational forms that originated in the corporate world. Although this might have helped in creating marketable products, since that is what corporate

Science and Authority

If Science C is about curiosity, and as such constitutes a potential threat to those with power, science can also mean authority. Anyone making any claim wants to say that science backs them. In popular media, scientists from government and prestigious universities can make authoritative statements because they possess scientific authority. Let us call this aspect of science Science A, for authority. Ideally, the practice of Science C can lead to the authority of Science A. But in reality, the authority of Science A is abused and sold as a commodity.

In a famous case from the mid-'90s, University of Toronto medical researcher Nancy Olivieri discovered harmful effects of a blood disorder drug called Deferiprone. In the stir of controversy that followed, Olivieri was forced to defend herself, her research, and her job against a wide range of attacks from the drug manufacturer and senior staff at her hospital.

The most pressing attack on scientific authority today, however, centres on the consensus of climate scientists at the Intergovernmental Panel on Climate Change, which released its fifth and most dire report this past October. Before resigning from NASA as the world's leading climatologist, James Hansen once lamented "the politicization of reporting of global warming." Hansen stressed that with corporate consolidation of the media, the task of resisting the negative politicization of scientific inquiry, including attacks on the credibility of scientists, is "formidable."

Such direct attacks on scientific authority are relatively rare, but they reveal how powerful business interests seek to discredit scientific authority when scientific findings challenge their profits and social control. More insidiously, such business interests do not merely wait to attack scientific results they don't like. On the contrary, they have developed sophisticated ways of channelling and controlling scientific curiosity.

Science and Liberation

Justin Podur

A colleague of mine in environmental science recently told me that he is about to run out of funding since his Natural Sciences and Engineering Research Council (NSERC) discovery grant has not been renewed, twice in a row. Scientists like him, focused as they are on their work, are encouraged to think their funding has not been renewed because there is something wrong with them or their research. In fact, there are broader social forces at play.

It turns out that the feminist slogan the personal is political is relevant to science as well. For decades, the membership card in the club of Canadian scientists was the NSERC discovery grant. The purpose of the grant was to give every working scientist basic funding to do their research. In recent years, two changes have been made to this paradigm. First, as detailed in a new book by Chris Turner, the federal government has declared an outright war on science, cutting funding for basic research and redirecting it to business-friendly projects. Second, NSERC has moved to a model of rewarding "excellence," which in fact has nothing to do with excellence but means concentrating funding with smaller numbers of researchers while leaving many researchers with nothing.

Last September, a group of scientists took the unique step of organizing themselves into a movement called Evidence for Democracy. Mounting a series of rallies and media events, they announced a platform targeting the federal government with three demands: to fund research from basic through to applied science; to base decisions on the

best available science and evidence; and to make scientific findings open to the public.

While their demands are hardly radical, these scientists have been galvanized to step out of their labs and enter the public sphere because of a Canadian government that, like the North American conservative movement from which it sprang, dislikes science. We are at a point in Canada where Prime Minister Harper's government controls communications by government scientists from Environment Canada and the Department of Fisheries and Oceans. It has eliminated the position of national science adviser. It has scrapped Statistics Canada's long-form census (vital to research on social inequality) and closed labs and environmental monitoring stations. And more than any other government in the world today, the Canadian government is dedicated to denying the results of climate change science and preventing civilization-saving action at international climate forums.

The conservative movement's attack on science has several prongs. Where they can attain government office, as in Canada, they use the highly effective tools of funding and de-funding, and regulation and de-regulation, to control government scientists and embolden private interests. The goal is to transfer power and resources from public services and public science to private institutions, while often appealing to moral and religious doctrines in the process.

The success of these attacks on science are partly due to vulnerabilities caused by the way science itself is done in our society, for the word science has multiple meanings.

Science and Curiosity

Albert Einstein said that science is the refinement of everyday thinking. In that sense, science is a fundamental human activity: it means paying attention to evidence, using logic, rendering explicit assumptions, and testing hypotheses formally in a way that is repeatable by others. It is this kind of science that is under attack from

conservatives and other forms of authority. Let us call this kind of science Science C, where C stands for curiosity.

Today, hacker subculture exemplifies Science C better than academic science does. Hackers are dedicated to following their curiosity wherever it goes, and the open-source, free software movement that most hackers belong to is also dedicated to making information freely and universally accessible. No one exemplified Science C and hacker culture better than Aaron Swartz. Swartz developed Creative Commons, Reddit, and other innovative works before moving into activism explicitly.

Creative Commons is an organization and a licensing system that facilitates the sharing and use of creative work. Like the GNU Public License (GPL) for software developed by Richard Stallman, Creative Commons has an implicit philosophy that creative work is a collective endeavour and that human instincts to share knowledge and information should be celebrated and encouraged, not suppressed. This is the spirit of Science C.

Creative Commons and the GPL are legal tools to facilitate sharing, and in their domains they are analogous to peer review and publication in scientific journals for scientists. However, like the conflict between free and proprietary software, there is a conflict between open access and proprietary access to scientific publications, a conflict Aaron Swartz became aware of as an activist.

Swartz was so appalled by the privatization of scientific knowledge in expensive journals that he took direct action to make the journals public, breaking the copyright of the academic database known as JSTOR. As Swartz explained, without broad public access, "Everything up until now will have been lost." Swartz believed the commodification of essential knowledge must be vigorously resisted: "Forcing academics to pay money to read the work of their colleagues? Scanning entire libraries but only allowing the folks at Google to read them? Providing scientific articles to those at elite universities in the First World but not to children in the Global South? It's outrageous and unacceptable."

Facing dire federal charges that could have landed him in jail for decades, Aaron Swartz committed suicide in January 2013.